Name *Period* *Date*

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Sonar in the Science Lab

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How do we map the ocean floor?

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For each student or group:

Data collection system
Motion sensor
Graph paper
Classroom objects for simulated ocean floor (desks, chairs, books, et cetera)

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Add this important safety precaution to your normal laboratory procedures:

Look where you are going when walking with the motion sensor.

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We have all seen a map of the world. Have you ever wondered how these maps are made? What about a map of the ocean floor? How can we know what the ocean floor looks like under all that water? Why would we want to map the ocean floor? Discuss with your partners.

One of the first methods developed to map the ocean floor was the use of a leadline. A lead-weighted line was dropped from the side of a boat. When the line struck a surface, researchers would note the distance from the ocean surface. A series of measurements over a small area provided a simple picture of a small area of the ocean basin. With your group, try this method with your shoebox models.

Mark your measurements on graph paper to build your model.

What are the limitations to this method? Could we map the whole ocean this way?

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_____

Sonar technology is often used to gather data about the ocean basin. Ships send a signal, or energy wave, to the ocean floor. A receiver on the ship records the time it takes for the signal to be reflected and travel back to the ship. With knowledge about the velocity of the energy waves the distance to the bottom is calculated and plotted. The process is repeated for many locations until the shape of the structures becomes evident.

[illegible]

The steps below are part of the Procedure for this lab activity. They are not in the right order. Determine the proper order and write numbers in the circles that put the steps in the correct sequence.

[illegible]

Note. When you see the symbol " " with a superscripted number following a step, refer to the numbered Tech

2. Draw a prediction of the profile of the structures you have placed on the floor that you expect to see when graphed by a motion sensor.

Labeled Sketch of Ocean floor

10. Why do you think it is important to move at a constant velocity?

_____

_____

_____

11. Stop data recording (6.2)

4. How is sonar or radar used by scientists to map the floor of the earth's oceans?

_____

_____

_____

5. To make your results more accurate, what could be graphed on the x-axis instead of time?

_____

_____

6. Why is it important to map the ocean floor?

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7. How has technology changed our understanding of the ocean floor?

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Circle the best answer or completion to each of the questions or incomplete statements below.

1. An area of the ocean floor that plunges steeply

3. A principal drawback of using a leadline was

- **A. Mariners and sailors had difficulty using it properly**
- **B. It took a lot of effort to produce a small amount of data**
- **C. Ships using leadlines were more vulnerable to pirate attacks**

4. How would an ocean floor map produced with sonar mainly be different from one produced without the use of such technology?

- **A. The sonar map would give the actual depth for a particular location**
- **B. The sonar map would contain much more data**
- **C. The sonar map would show where the best fishing grounds would be**

5. How is the motion sensor similar to the sonar devices used to map the ocean floor?

- **A. The motion sensor can be used to determine an object's position, velocity, and acceleration.**
- **B. The motion sensor must be held still at all times**
- **C. The motion sensor sends out energy waves which are reflected back to their source**

6. Suppose you want to model a trench, followed by a seamount, followed by an abyssal plain.

10. If you were on a sonar-carrying ship, with no land anywhere in sight, and you saw that the depth readings were decreasing steadily as you continued traveling in a particular direction, what might you conclude about the shape of the ocean floor over which you were sailing?

- **A. The ship must be approaching an island or continent**
- **B. The ocean floor must be getting deeper**
- **C. The ocean floor must be getting shallower**

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Enter a "T" if the statement is true or an "F" if it is false.

_____1. One form of technology used to map the floors of earth's oceans is sonar.

_____2. The motion sensor sends out a sound energy beam that reflects off a nearby object back to the sensor.

_____3. The position versus time graph of a simulated ocean floor appears exactly like the profile of the objects used to build the model.

_____4. Any change in position with respect to a reference point is known as motion.

_____5. By mapping the ocean floor, scientists can learn a great deal about the earth.